Pehrson Residence
Seattle, WA
Photo: Steve Keating
Architect: Clint Pehrson Architects

Engineered Wood Products (EWP)

- Prefabricated Wood I-Joists
- Laminated Veneer Lumber (LVL)
- Parallel Strand Lumber (PSL)

Prefabricated Wood I-Joists

Introduction

Prefabricated wood I-joists are made by gluing solid sawn lumber or laminated veneer lumber (LVL) flanges to a plywood or oriented strandboard (OSB) panel web to produce a dimensionally stable light-weight member with known engineering properties.

The uniform stiffness, strength, and light weight of these prefabricated structural products makes them well suited for longer span joist and rafter applications for both residential and commercial construction.

The "I" shape of these products gives a high strength to weight ratio. For example, wood I-joists 241mm (9-1/2") deep and 8m (26'-3") long weigh between 23kg (50 lbs.) and 32kg (70 lbs.), depending on the flange size. This means that they can be installed manually, giving advantages in labour and economy.

Factory-prepunched knock-out holes in the webs facilitate the installation of electrical services. The knockout holes also provide ventilation when the joists are used in a cathedral type ceiling with no attic above. Some manufacturers specifically offer I-joists with ventilation holes predrilled through the web for use in cathedral ceilings.

Holes for plumbing and mechanical ductwork may be drilled easily through the web, but must be located according to the manufacturer's recommendations.

The wide flanges allow for a good fastening surface for sheathing, and the product can be cut and worked using common wood working tools. However, the flanges should never be notched or drilled and all special cuts, such as bird's mouth bearing cuts, must follow the manufacturer's recommendations.

In some areas there may be difficulty in obtaining large dimensions of solid sawn framing lumber. The availability of wood I-joists used as floorjoists and as deep, insulated roof joists has made them a popular product for lightweight structural members for rafter and joist applications. They are an economical alternative to open web steel joists.

Several different types of prefabricated wood I-joists are commercially available. Each type features a different combination of flange and web materials, and a different connection between the web and the flanges.

The joint between the flange and the web is a critical element of member strength and is typically protected by patent by each manufacturer.

Flanges are commonly made of laminated veneer lumber (LVL), visually graded lumber, or MSR lumber.

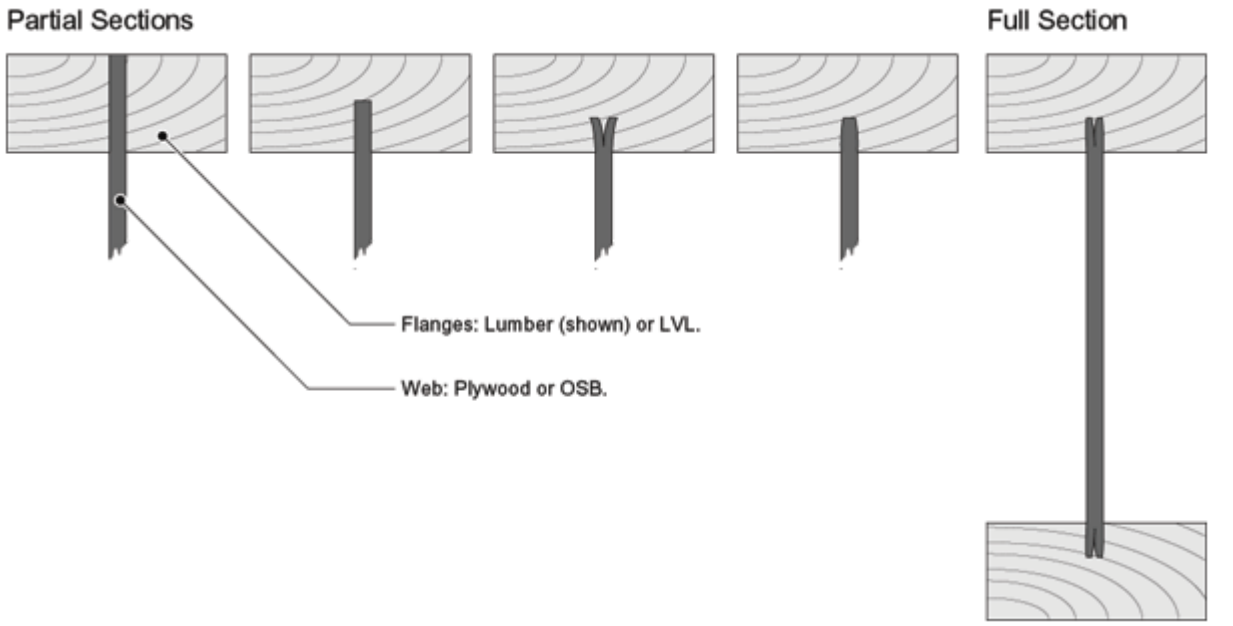
The webs are made of either oriented strandboard (OSB) or plywood.

Web panel joints are glued and mated by several methods such as butting of square panel ends, scarfing of the panel ends, and shaping of either a toothed or tongue and groove type joint. The use of longer OSB panels is gaining acceptance as a means of lowering the number of end-to-end panel

joints in the web.

Exterior rated phenol-formaldehyde and phenol-resorcinol are the principle adhesives used for the web to web and web to flange joints.

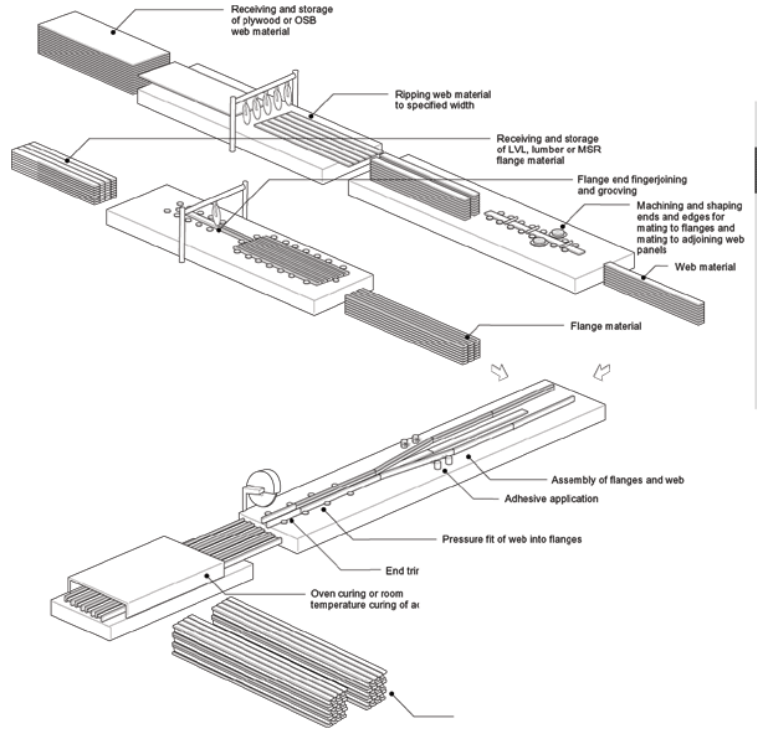
Figure 1: Flange to Web Joints for Wood I-Joists



Manufacture

Wood I-joists are proprietary products and the method of manufacture varies somewhat from one manufacturer to another. A general representation of the manufacturing process is shown in Figure 2.

Figure 2: Manufacture of Wood I-Joists



As in the manufacture of other engineered wood products, moisture control of the flange and web material is important to ensure optimum gluing conditions, and dimensional stability of the finished product. All material must be dry, with an equilibrium moisture content (EMC) in the range of at least 8 percent and no more than 18 percent. It must also be conditioned to room temperature of at least 10ºC 50ºF).

Prior to assembly, the solid sawn flange material is fingerjoined into long lengths (no butt joints are allowed in the flanges of prefabricated wood I-joists). A groove for acceptance of the web is routed into one face of the flange material.

The web material is cut to the size required to give the appropriate depth to the assembled wood I-joist. The web ends that form the web joints are cut or machined as required and the web edges that mate with the flanges are machined, shaped or crimped as required.

Adhesive is spread on the web ends to form glued web joints and adhesive is placed into the flange routs to form a glued flange to web connection. The top and bottom flanges are of equal specified lengths and are end aligned with one another, prior to joist assembly. The flanges are pressed onto the long edges of the webs just after the web joints are mated to complete assembly of the joist.

Prior to curing, the assembled joists are cut to specified lengths. The joists are generally placed in a low temperature oven or curing environment (21 to 65ºC 70 to 150ºF)) for a specified period to insure proper cure of the adhesive.

After curing, the product is inspected and then bundled and wrapped for temporary storage or shipment.

Sizes Available

Prefabricated wood I-joists are manufactured in a range of sizes. Long lengths use fingerjoining to splice flanges and butt jointing or toothed, tongue and groove or scarf configurations to splice the webs. The actual length is limited only by transportation restrictions to about 20m (66').

The depths of prefabricated wood I-joists range from 241mm (9-1/2") to 508mm (20") as shown in Table 1 although special orders in depths up to 762mm (30") can be made.

Table 1 I-Joist - Standard Depths

Size (bxd)	
mm	**in.**
241	9-1/2
292	11-1/2
302	11-7/8
318	12-1/2
356	14
406	16
457	18
508	20

Note:

1. Refer to manufacturer's literature for widths and specific load bearing capacity.

Flange depths are commonly 38mm (1-1/2") and common flange widths vary from 45mm (1-3/4") to 89mm (3-1/2"). Web thickness varies from 9.5mm (3/8") to 12.7mm (1/2").

Prefabricated wood I-joists generally weigh from about 3kg per metre (2 lbs. per foot) to 9kg per metre (6 lbs. per foot) for the deepest sections.

Quality Control

The expected performance of a prefabricated wood I-joist is dependent upon the quality of the material used in its production and the quality of the production process.

Because each manufacturer is likely to use a different material source and a different production process, custom production procedures must be established.

Moreover, the quality of material purchased for the manufacture of wood I-joists varies and therefore a quality assurance program that monitors daily production, and independent third party quality audits conducted by an accredited certifying agency on a regular basis are necessary.

Before commercial production begins, each manufacturer's product must be extensively tested to determine the engineering properties. Once production is started, a random sample of product is frequently selected for testing to ensure the manufacturing materials and processes meet prescribed strength values.

Prefabricated wood I-joists are proprietary products having engineering qualities dependent on the materials and flange joints used and production process variables. Therefore designers and installers follow the design guidelines as well as the installation guidelines of the individual manufacturers.

The Canadian Construction Materials Centre (CCMC) has issued product evaluations for many of the prefabricated wood I-joists marketed in Canada.

In the United States, the International Conference of Building Officials (ICBO) has published a document titled *Acceptance Criteria for Prefabricated Wood I-Joists*, for evaluation of these products. The Council of American Building Officials (CABO) has issued product evaluations for I-joists.

The recent ASTM Standard D5055, *Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists*, outlines procedures for establishing strength values and controlling the quality of prefabricated wood I-joists.

Installation

Openings can be cut through the webs of prefabricated wood I-joists for the passage of utilities such as heat ducts and plumbing. Manufacturers provide clear, definite guidelines in their product catalogues for the shape (round and rectangular), size, and location of holes in the web.

The permissible placement and size of holes is different for each manufacturer and therefore the specific manufacturers' recommendations for a product should be followed.

While limited size holes can be made for ductwork and mechanical services, the location and size must be specifically approved by the manufacturer.

Manufacturers are also specific about the use of web reinforcement or blocking at beam supports and points of concentrated loads. Reinforcement is intended to prevent local buckling of the web material, to minimize bearing distance at supports, and to transfer shear loads into reaction.

Vertical transfer of loads from above at the bearing locations may require the addition of cripples or blocking. This may be accomplished with pieces of lumber, plywood, OSB or short sections of the I-joist itself. All blocking should be installed according to the manufacturers recommendations.

As with all structural elements, prefabricated wood I-joists must be adequately braced during installation. The manufacturer's recommendations must be followed and include required bracing to end walls or existing deck at the ends of building bays.

Most recommendations require that all hangers, blocking, rim joists, and temporary bracing be installed before workers are allowed on the I-joists. Lateral bracing of the top flanges with 19 x 89mm (1" x 4" nom.) wood strapping, spaced at 2.4m (8') to 3.05m (10') before sheathing is permanently attached, is typical.

Where it is necessary to suspend mechanical services from a prefabricated wood I-joist floor or roof, precautions should be taken to ensure that concentrated loads are not passed directly to the lower flanges. In all cases, the manufacturers' recommendations should be followed.

Fire Safety

Fire Safety Prefabricated wood I-joists are used in light wood-frame floor and roof assemblies for many residential and commercial buildings. Most of the leading manufacturers have conducted fire tests and evaluations for common floor and roof assemblies to determine the fire performance of their wood I-joist products.

These evaluations are usually done by accredited certifying agencies and are applicable only to the specific proprietary prefabricated wood I-joist product and other assembly components being evaluated.

Information regarding the fire performance of assemblies incorporating specific prefabricated wood I-joists is available from the manufacturers. Such information is also available in listings books of the accredited certifying agencies such as Underwriters' Laboratories of Canada (ULC) or Warnock Hersey Professional Services Ltd. in Canada or Underwriters' Laboratories Inc. (ULI) in the US.

The Fire Safety Design in Buildings book provides details on the types of buildings which can be constructed using prefabricated wood I-joists in light frame construction while meeting fire safety requirements.

General guidelines for prefabricated wood I-Joists:

- Manufacturers' catalogues and evaluation reports are the primary sources of information for design, typical installation details, and performance characteristics.
- Typical considerations needed for product specification include: product availability, product sizes available (i.e. depths and lengths) availability of approved connectors, certified fire and sound assembly information, engineering and technical support provided by the manufacturer, product quality, product warranty, product acceptance and code approvals, and installed cost effectiveness.
- It is particularly important that prefabricated wood I-joists should be protected from the weather during job site storage and installation. Wrapping of the product for shipment to the job site is important providing moisture protection.

Laminated Veneer Lumber (LVL)

Introduction

Laminated veneer lumber (LVL) is a layered composite of wood veneers and adhesive. Once it is fabricated into billets of various thicknesses and widths, it can be cut at the factory into stock for headers and beams, flanges for prefabricated wood I-joists, or for other specific uses. Veneer thicknesses range from 2.5mm (0.10") to 4.8mm (3/16") and common species are Douglas fir, larch, southern yellow pine and poplar.

In LVL, the grain of each layer of veneer runs in the same (long) direction with the result that it is strong when edge loaded as a beam or face loaded as a plank. This kind of lamination is called parallel-lamination, and it produces a material with greater uniformity and predictability than the same dimension material made by cross-lamination.

LVL is a solid, highly predictable, uniform lumber product because natural defects such as knots, slope of grain and splits have been dispersed throughout the material or have been removed altogether. It is made of dried and graded veneer which is coated with waterproof adhesives, assembled in an arranged pattern, and formed into billets by curing in a heated press.

One leading manufacturer grades the veneers with advanced ultrasonic grading technology in addition to visual grading. Dependent on the end use of the LVL product the ultrasonically graded veneers are specifically located in the material to utilize efficiently the strength characteristics if the veneer grades. For example, if the end use of the LVL product is scaffold plank, the higher grade veneers will be placed at the outer faces of the plank.

LVL was first used during World War II to make airplane propellers, and since the mid-1970s, has been available as a construction product for beams and headers where high strength, dimension stability, and reliability are required.

Like other products made by laminating pieces of wood together to create a structural element such as plywood, glulam, parallel strand lumber (PSL), or OSB/waferboard, LVL offers the advantages of higher reliability and lower variability through defect removal and dispersal.

The veneering and gluing process of LVL enables large members to be made from relatively small trees thereby providing for efficient utilization of wood fibre.

Engineering standards in Canada and the US refer to LVL and parallel strand lumber (PSL) together as structural composite lumber (SCL).

Uses

LVL is used primarily as structural framing for residential and commercial construction and is well suited to applications where open web steel joists and light steel beams might be considered.

Finished or architectural grade appearance is available from some manufacturers, usually at an additional cost. However, when it is desired to use LVL in applications where appearance is important, common wood finishing techniques can be used to accent grain and to protect the wood surface. In finished appearance, LVL resembles plywood or lumber on the beam face.

Other uses include scaffold planking and as flange members for some proprietary prefabricated wood I-joists.

LVL has also been used as distribution an transmission cross arms in utility structure box shaped roadway sign posts, and as truckbed decking with hardwood face veneers.

LVL can easily be cut to length at the jobsite. The fastening and connection details and requirements are similar to those of solid sawn lumber. However, all special cutting, notching or drilling should be done in accordance with manufacturer recommendations.

Strength and Appearance

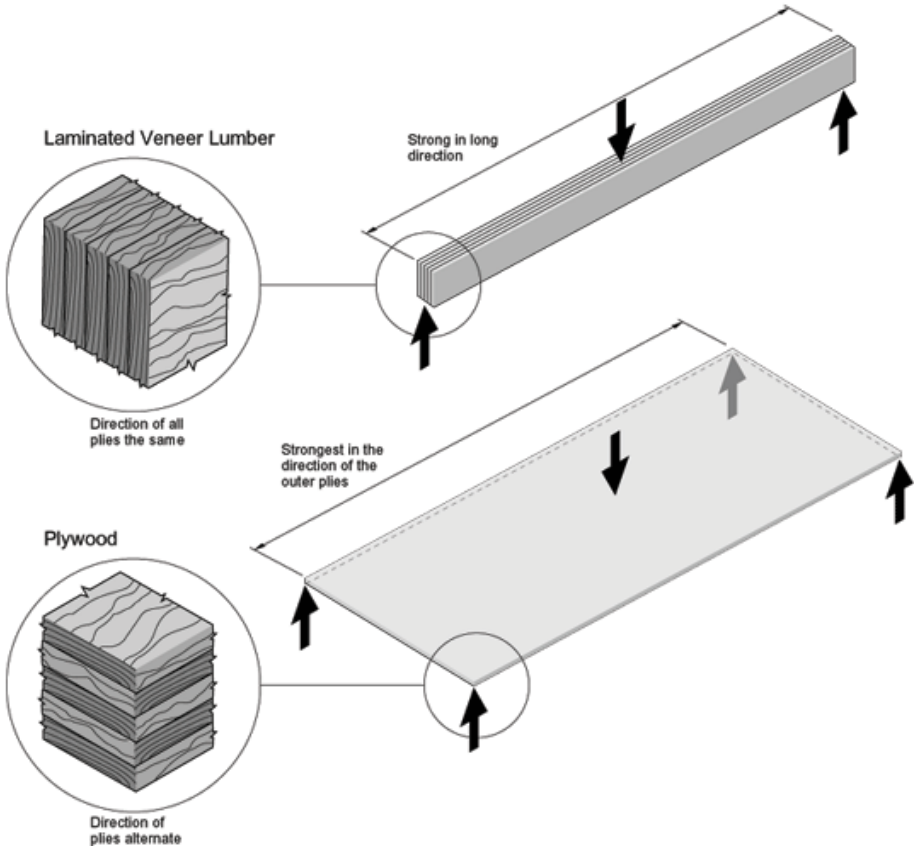
LVL is mainly a structural material, most often used in applications where the material is concealed and therefore where appearance is not important. Finished or architectural grade appearance is available from some manufacturers, usually at an additional cost.

However, when it is desired to use LVL in applications where appearance is important, common wood finishing techniques can be used to accent grain and to protect the wood surface. In finished appearance, LVL resembles plywood or lumber on the beam face.

Manufacture

The initial steps of manufacture of LVL are similar to those used in the manufacture of plywood. Typically, logs are rotary peeled on a lathe to create veneer sheets from 2.5mm (1/10") up to 4.8mm (3/16") in thickness. Veneer sheets are generally about 2640mm (104") long by either 1320mm (52") or 660mm (26") wide.

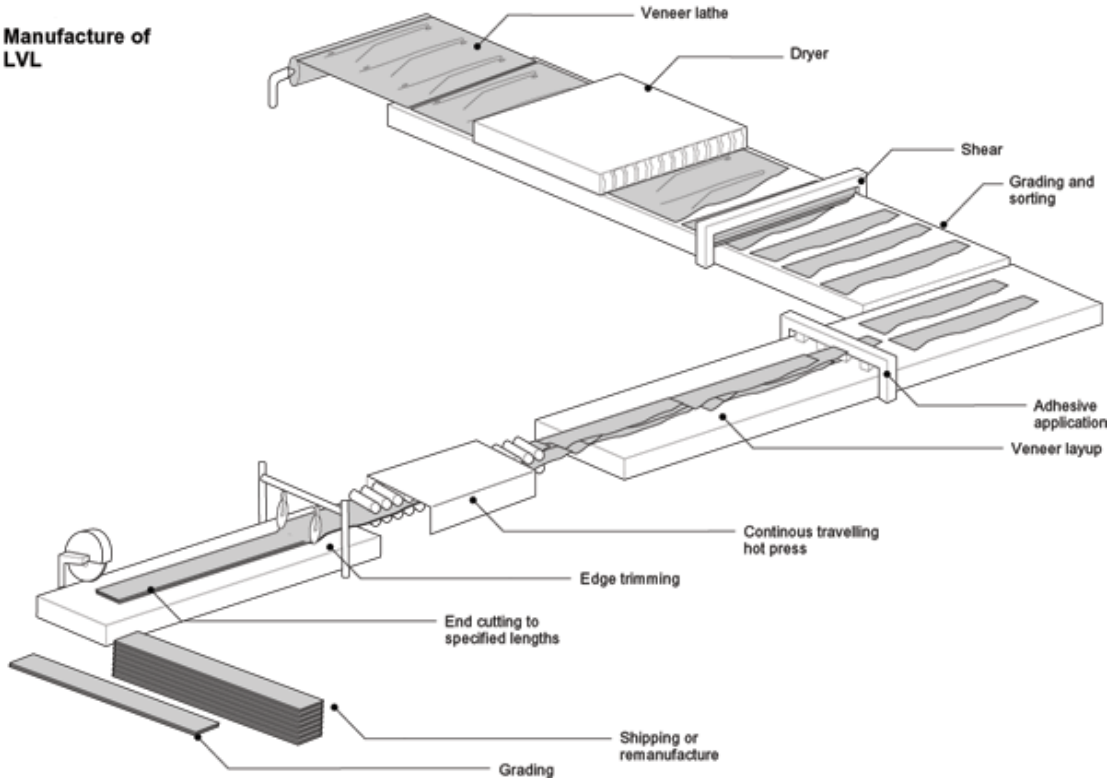
Figure 1: Ply Orientation of LVL



The veneer sheets are dried, clipped to remove major strength reducing defects, and graded. The sheets are cut to the required width for the billet to be produced.

The individual veneers are then assembled with the grain of all veneers running in the long direction of the billet. End joints between individual pieces of veneer are staggered along the length of the billet to disperse any remaining strength reducing defects. The joints may be scarf jointed or overlapped for some distance to provide load transfer.

Figure 2: Manufacture of LVL



The veneer lengths are coated with a waterproof phenol-formaldehyde resin adhesive. The assembled billets are subjected simultaneously to pressure to consolidate the veneers, and to heat to accelerate curing of the adhesive. Once again, this aspect of the process is similar to that for plywood except that rather than being in a thin flat panel shape, the LVL material is formed into long billets up to 25m (80') in length.

Once cured, the billets are sawn to custom lengths and widths as desired for the product end use.

Sizes

LVL is available in lengths up to 24.4m (80'), while more common lengths are 14.6m (48'), 17m (56'), 18.3m (60') and 20.1m (66').

LVL is manufactured in thicknesses from l9mm (3/4") to 64mm (2-1/2"). One manufacturer also offers an 89mm (3-l/2") thickness.

The most common thickness used in construction is 45mm (1-3/4"), from which wider beams can be easily constructed by gun-nailing the plies together on site.

LVL is manufactured in billet widths of 610mm (24") or 1220mm (48"). The desired LVL beam depth may be cut from these billet widths. Commonly used LVL beam depths, as shown in Table 1, are 241mm (9-1/2"), 302mm (11-7/8"), 356mm (14"), 406mm (16") and 476mm (18-3/4"). Depths of 140mm (5-1/2"), 184mm (7-1/4") and 610mm (24") are also available.

Table 1: LVL - Standard Sizes	
Size (bxd)	
mm.	in.
45 x 241	1-3/4 x 9-1/2
45 x 302	1-3/4 x 11-7/8
45 x 356	1-3/4 x 14
45 x 406	1-3/4 x 16
45 x 476	1-3/4 x 18-3/4

Quality Control

The manufacture of LVL requires an in-house quality assurance organization. Regular independent third party quality audits by a certification organization are a required part of the manufacturers' quality assurance program.

LVL products are tested and approved for use by the major code and product evaluation agencies in the United States and Canada. All manufactured LVL products which have been tested and approved in this way should bear the seal of the certification agency, the manufacturer, date of manufacture, grade of LVL and reference to any applicable code or evaluation agency approval numbers.

LVL is a proprietary product having engineering properties that are dependent on the materials used in the manufacture and on the product assembly and manufacturing processes. As such, it does not meet a common standard of production. Therefore,

designers and installers should follow the design, use and installation guidelines of the individual manufacturers.

The Canadian Construction Materials Centre (CCMC) has issued product evaluations for many of the LVL products marketed in Canada. In the United States, most manufacturers have obtained product evaluation reports from the Council of American Building Officials (CABO).

Currently, a standard for the specification for evaluation of structural composite lumber products (such as LVL and PSL) is under development by ASTM. This standard will outline procedures for establishing, monitoring and re-evaluating structural capacities of structural composite lumber and will also detail minimum requirements for establishment of quality control, assurance and audit.

Fire Safety

LVL is a wood-based product and will react to fire much the same as a comparable size of solid sawn lumber or a glued-laminated beam.

The phenol-formaldehyde resin adhesive used in manufacture are inert once cured. Therefore they do not contribute to the fire load and the strength of the bond is not adversely affected by heat. When used in fire-rated floor or roof assemblies, the performance of LVL is similar to solid sawn lumber or glued-laminated timber. For more detailed information regarding the fire ratings of LVL products, contact a manufacturer.

Laminated Strand Lumber (LSL)

LSL is the latest engineered wood product to come onto the market. This revolutionary product is used for a broad range of applications including rim board, millwork and window, door and garage door headers, as well as for many industrial uses. New uses for this product are still evolving, including the use of LSL for vertical members in commercial applications where the framing member heights are long, and the wind loads are substantial.

LSL resembles oriented strandboard in appearance because like OSB, LSL is made from long strands coming from fast-growing aspen or poplar. However, unlike OSB, the strands are arranged parallel to the axis of the member. Like other engineered wood products like LVL and PSL, LSL offers predictable strength, outstanding weatherability and dimensional stability that eliminates twist and shrinkage.

General Guidelines for LVL

- LVL products are available from most major lumber dealers in Canada and the United States. LVL products may also be ordered directly from the manufacturer.
- Manufacturers' catalogues and evaluation reports are the primary sources of information for design, typical installation details, and performance characteristics.
- Typical considerations for product specification should include: product availability, product sizes available (i.e. widths, depths & lengths), availability of connectors, engineering and technical support provided by the manufacturer, product quality, product warranty, product acceptance and code approval and installed cost effectiveness.
- As with any other wood product, LVL should be protected from the weather, during jobsite storage and after installation. Wrapping of the product for shipment to the job site is important in providing moisture protection. End and edge sealing of the product will enhance its resistance to moisture penetration.

Parallel Strand Lumber (PSL)

Introduction

Parallel strand lumber (PSL) is a high strength structural composite lumber product manufactured by gluing strands of wood together under pressure. It is a proprietary product marketed under the trade name Parallam®.

Because it is a glued-manufactured product. PSL can be made in long lengths but it is usually limited to 20m (66 ft.) by transportation constraints.

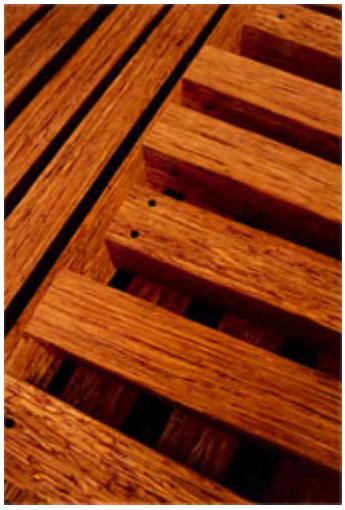
Manufactured at a moisture content of 11 percent, which is approximately the equilibrium moisture content of wood in most service conditions, PSL is less prone to shrinking, warping , cupping, bowing or splitting.

It is manufactured in Canada from Douglas fir and in the United States from southern pine from wood strands from which the growth imperfections have been removed. This results in product having consistent properties and high load carrying ability. As smaller plantation and second growth timber finds its way into the market place to a greater extent, PSL provides a means of ensuring the availability of a large dimension and high quality wood product.

The manufacturing process for PSL results in a strong, consistent material that is resistant to seasoning stresses.

Engineering standards in Canada and the US refer to PSL and laminated veneer lumber (LVL) together as structural composite lumber (SCL).

Uses



PSL is well suited for use as beams and columns for post and beam construction, and for beams, headers, and lintels for light framing construction.

It is used for large members in residential construction and as intermediate and large members in commercial building construction.

Visually, PSL is an attractive material which is suited to applications where finished appearance is important. It is also suited to concealed structural applications where appearance is not a factor.

PSL readily accepts preservative treatment and a very high degree of penetration and therefore protection is possible. Treated PSL should be specified for members which will be directly exposed to high humidity conditions.

Strength and Appearance

Parallel strand lumber exhibits the dark glue line of glue-laminated timber except that the glue lines are much more numerous.

PSL can be machined, stained, and finished using the techniques applicable to sawn lumber.

Differing slightly from the finished appearance of sawn lumber or glulam, PSL retains the rich textures displayed by wood products used for exposed structure, as in post and beam construction.

The appearance of PSL allows for the structural members to be designed to view so that both functional and aesthetic design needs can be met. PSL members readily accept stain to enhance the warmth and texture of wood.

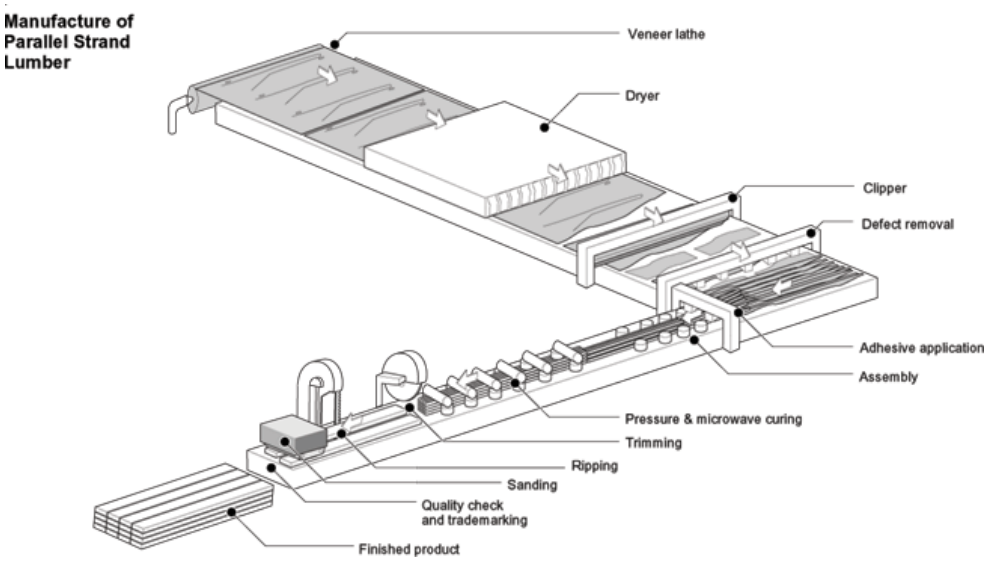
All PSL is sanded at the tail end of the production process to ensure precise dimensions and to provide a high quality surface for appearance.

PSL readily accepts preservative treatment and a very high degree of penetration and therefore protection is possible. Treated PSL should be specified for members which will be directly exposed to high humidity conditions.

Manufacture

The initial steps of PSL manufacture as shown in Figure 1 are similar to those used in the manufacture of plywood. Logs are turned on a lathe to create veneer and the veneer sheets are oven dried.

Figure 1: Manufacture of PSL



The veneer sheets are clipped into long narrow strands of wood up to 2.4m (8') in length and about 13mm (1/2") in width. Major strength reducing defects are removed from the sheets.

The strands are coated completely with an exterior-type adhesive (phenol-formaldehyde), laid-up with the strands oriented to the length of the member, and formed into a continuous billet which is fed into a belt press. Under pressure and microwave generated heat, the glue is cured to produce a finished continuous billet 280 x 406mm (11" x 16") in cross-section.

The billet is cross cut to desired lengths, rip sawn to produce rough stock dimensions or custom sizes, and sanded down to finish dimensions. Larger dimensions are produced by edge gluing billets together using techniques common to those used for the manufacture of glulam.

Sizes Available

The stock sizes available for PSL are intended to be compatible with established wood framing materials and standard dimensions. Stock PSL sizes for beams and columns are shown in Table 1.

Table 1: PSL - Standard Sizes			
Beam Sizes (bxd)		Column Sizes (bxd)	
mm.	in.	mm.	in.
45 x 241	1-3/4 x 9-1/2	89 x 89	3-1/2 x 3-1/2
45 x 292	1-3/4 x 11-1/2	89 x 133	3-1/2 x 5-1/4
45 x 318	1-3/4 x 12-1/2	89 x 178	3-1/2 x 7
45 x 356	1-3/4 x 14	133 x 133	5-1/4 x 5-1/4
89 x 241	3-1/2 x 9-1/2	133 x 178	5-1/4 x 7
89 x 292	3-1/2 x 11-1/2	178 x 178	7 x 7
89 x 318	3-1/2 x 12-1/2		
89 x 356	3-1/2 x 14		
89 x 406	3-1/2 x 16		
89 x 457	3-1/2 x 18		
133 x 241	5-1/4 x 9-1/2		
133 x 292	5-1/4 x 11-1/2		
133 x 318	5-1/4 x 12-1/2		
133 x 356	5-1/4 x 14		
133 x 406	5-1/4 x 16		
133 x 457	5-1/4 x 18		
178 x 241	7-1/2 x 9-1/2		
178 x 292	7-1/2 x 11-1/2		
178 x 318	7-1/2 x 12-1/2		
178 x 356	7-1/2 x 14		
178 x 406	7-1/2 x 16		
178 x 457	7-1/2 x 18		

PSL beams are sold in thicknesses of 45mm (1-3/4"), 68mm (2-11/16"), 89mm (3-1/2"), 133mm (5-1/4"), and 178mm (7"). The smaller thicknesses can be used individually as single plies or can be combined for multi-ply applications.

PSL can be ordered in lengths up to 20m (66 ft.). Although it can be sawn to any dimension, its economy is maximized in uses where light to medium steel sections are practical.

High design values, a multitude of cross sections, and long lengths permit flexibility in building design.

Quality control

The PSL manufacturing process includes tight controls on the raw material inputs, product assembly, and finished product properties to ensure a consistent, high quality, reliable product. Because the process involves the removal of strength reducing defects from the wood strands, the main quality control procedure is the checking for consistent density in the finished product.

PSL is a proprietary product which has been evaluated and accepted for use by the Canadian Construction Materials Centre (CCMC) and by the Council of American Building Officials (CABO).

A standard for the manufacture of PSL (and other structural composite materials such as laminated veneer lumber (LVL)) under development by ASTM. This standard will outline procedures for establishing monitoring and re-evaluating structural capacities of structural composite lumber and will also detail minimum requirements for establishment of quality control, assurance and audit.

Connections

Common wood connectors appropriate to the size of the members are used for PSL. These range from nails and joist hangers for the smallest sections to bolts, split rings, and shear plates for larger sized members.

As for all wood materials and in fact all major building materials, galvanized connections should be used for high humidity applications.

Fire Safety

Research conducted to measure the performance of PSL when exposed to fire demonstrates that it is appropriate for use in all applications for which solid sawn lumber and timbers are suited.

As a result of evaluations done in Canada by the Canadian Construction Materials Center (CCMC) and in the US by the Council of American Building Officials (CABO) PSL has been accepted for use in Heavy Timber construction when of appropriate cross section. Like timbers and glulam members, PSL of large cross section has proven to be resistant to fire because the low thermal conductivity of wood retards heat penetration, and slow charring rates allow these large members to maintain a high percentage of their original section.

The Fire Safety Design in Buildings book provides further information on building code requirements relating to fire safety and details the minimum size requirements for Heavy Timber construction.

General Guidelines for PSL

- Determine the load capacity required.
- Select size of PSL member which will meet the required load capacity.
- Ask the local distributor for technical literature and contact the manufacturer engineering assistance is required.
- Determine if PSL members will be directly exposed to weathering or high temperature and high humidity for significant periods during the life of the structure. If so, consult with the manufacturer for information about preservative treatment.
- Check local availability for sizes and lengths.
- PSL is a patented product manufactured in both Canada and the US. For additional product information or technical information, contact MacMillan Bloedel Limited.